

**SMALL OPENING BEVERAGE CAN END
ADAPTED FOR RECEIVING A STRAW**

5

Field of the Invention

The present invention relates to beverage can ends, and more specifically metallic beverage can ends with a small opening adapted for receiving a straw.

Background of the Invention

10 In recent years, beverage containers which are designed to receive a drinking straw have become increasingly popular. The straw is especially beneficial for small children to prevent spilling, and for the physically handicapped or disabled which have difficulty drinking from a standard cup, or larger opening beverage can end. One such product described in U.S. Pat. No. 5,253,779 to Lee combines a compressible straw disposed within
15 the can body. Upon opening, the straw projects itself through a v-shaped panel for a user's benefit. Unfortunately, these types of products are undesirable since the flavor of the beverage becomes comprised from scalping as the straw is suspended for indefinite periods of time in the beverage. Additionally, it is possible for the straw to become obstructed and thus difficult to retrieve. Further, the opening disclosed in the '779 is too large to make the
20 container substantially spill-proof when the container is knocked over.

Two of the more common types of beverage containers which are adapted to receive a straw include cardboard juice cartons and metallic cans having a foil pull tab. With respect to the cardboard juice cartons, a foil tab or other impermeable material is positioned over a hole and pierced with a sharpened end of the straw to provide entry into the beverage

container. With regard to the metal cans, a foil pull tab is typically used which is removably interconnected to an upper surface of the metal juice can and positioned over an opening in the beverage can end.

Both of the aforementioned foil opening mechanisms have inherent problems. With
5 regard to the cardboard juice cartons, the nature of the squeezable cardboard makes the
beverage container conducive to spilling and prone to damage during shipping and bulk
storage. Additionally, when the foil is punctured with the sharpened straw, they often spill
as a result of a small child or adult inadvertently squeezing the juice carton. Thus, the goal
of preventing spilling is oftentimes exasperated by the collapsible nature of the cardboard
10 storage carton. Additionally, the foil is often difficult to pierce with a plastic drinking straw,
especially for the physically disabled. Thus, the goal of making a user friendly, spill-proof
drink container is not realized. Further, the durability of the foil is significantly less than a
typical metallic beverage can end, and is thus not suitable for high pressure applications,
hot-fillable pasteurized liquids, and other beverage can applications which require a high
15 degree of durability. Finally, flavor scalping may be an inherent problem as the enclosed
beverages are in contact with the foil, which has a tendency to alter the taste of the beverage
contained therein.

With regard to metallic beverage cans which utilize a liquid impervious foil pull-tab,
numerous additional problems exist. For example, small children and the elderly frequently
20 cannot remove the pull tab from the upper surface of the beverage can end due to the
adhesive materials required to hold the foil on the upper surface of the can end. Thus it is
often impossible for these individuals to remove the pull tab, let alone insert the straw into

the small hole. Additionally, these types of foil pull tabs require an adhesive bonding agent to interconnect the foil pull tab to the upper surface of the beverage can end which is both expensive and further likely to contaminate the taste of the beverage through scalping. Further, the leading edge of the small opening which is adapted to receive the straw and the 5 associated pull tab is typically very sharp, and presents the risk of cutting the finger of a user, especially children.

Finally, with the foil pull tab and the puncture type foil mechanisms used for drinking straws, there is an inherent venting problem since there is no significant size differential between the size of the straw and the opening to receive the straw. Thus, the beverage 10 becomes difficult to withdraw from the beverage can.

Thus, there is a significant need for a safe, durable metallic beverage can end which has an easy opening metallic pull tab with sufficient venting associated therein to allow a straw to be inserted and used by the handicapped, elderly, and small children, and which is substantially spill proof.

15

Summary of the Invention

It is thus one object of the present invention to provide an easy opening beverage can which is adapted to receive a drinking straw and which can be used by small children, the handicapped, and the elderly to dispense a liquid from a beverage can. It is a further aspect 20 of the present invention to provide a can opening mechanism which is familiar to a user and which does not contaminate or alter the taste of the beverage.

It is a further aspect of the present invention to locate the small opening in the beverage can end in a position which makes the beverage can end substantially spill proof. Thus, in one embodiment of the present invention the small opening is positioned substantially in the center of the beverage can end, thus inhibiting spillage when a drinking straw is inserted therein and the beverage container is tipped over.

It is another object of the present invention to create a durable beverage can end adapted for receiving a straw which can be used under pressure (75-100 psi) for storing certain types of carbonated liquids such as beer or soft drinks. Further, a metallic beverage can end is provided which is capable of holding hot-fill liquids such as pasteurized milk at the time the beverage is introduced into the can and which is durable enough to withstand shipping and mishandling during transportation and bulk storage.

In another aspect of the present invention a metallic beverage can end is provided which can be manufactured with the use of existing production equipment in a beverage can end manufacturing facility. Thus, significant time and money are saved since the conventional production lines in a beverage plant do not need to be significantly modified to create a small opening beverage can end which uses a metallic pull tab.

It is a further aspect of the present invention to provide a beverage can end which is adapted for receiving a straw and which does not have a pull tab with any significant sharp edges to substantially decrease the likelihood of any type of finger injury to the user pulling the pull tabs. Thus, in one aspect of the present invention a pull ring is provided which has substantially rounded corners along all edges and which additionally is substantially non-detachable from the beverage can end to avoid littering. In one embodiment of the present

invention a raised reinforcing bead is provided which substantially encircles the small opening and shrouds the opening to prevent inadvertent contact with a user's fingers.

Thus, in one aspect of the present invention, a small opening metallic beverage can end adapted for receiving a straw is provided, and which comprises:

- 5 a circular end wall adapted for interconnection to a beverage can body;
- a central panel integrally interconnected to said end wall;
- a tab having a pull ring on one end and a nose on an opposite end, said nose hingedly interconnected to an upper surface of said central panel;
- a rupturable score line positioned proximate to a center point of said central panel and
- 10 defining a substantially circular opening having a diameter no greater than about 0.4375 inches which is adapted for receiving a straw; and
- a vent opening positioned adjacent said substantially circular opening to provide adequate venting in said small opening beverage can end when a drinking straw is positioned within said substantially circular opening during use.

15

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front perspective view of a beverage can end showing the pull tab and a centrally disposed small opening;

Fig. 2 is a top plan view of the beverage can end of Fig. 1;

- 20 Fig. 3 is a bottom perspective view of the small opening beverage can end of Fig. 2;
- Fig. 4 is a top plan view of the small opening area and associated reinforcing bead of the beverage can end of Fig. 2;

Fig. 5 is a top plan view of the small opening beverage can end in an unopened position;

Fig. 6 is a top plan view of the small opening beverage can end of Fig. 5 with a pull tab pulled to a 90° position of opening;

5 Fig. 7 is a top plan view of the small opening beverage can end of Fig. 5 with the pull tab shown in a fully opened position;

Fig. 8 is a top plan view of one embodiment of the present invention and showing the progression between Figs. 8A - 8C of the opening process and identifying in a front elevation view in Figs. 8B - 8F the respective position of a raised bead which substantially surrounds
10 the small opening;

Fig. 9 is a top plan view showing a plurality of raised beads and/or score termination points used to inhibit the breakaway of the pull tab;

Fig. 10 is a top plan view of a plurality of small openings and identifying various possible shapes;

15 Fig. 11 is a top plan view of two different shaped pull tabs and cross sectional views related thereto which identify the rounded edges of the pull tabs; and

Fig. 12 is a front elevation view of a typical drinking straw positioned in the small opening of the beverage can end, and identifying the vent opening.

DETAILED DESCRIPTION

Fig. 1 is a front perspective view of one embodiment of a small opening beverage can end 2. The beverage can end 2 is generally comprised of a circular end wall 24 which
5 is interconnected to a center panel 4 with a countersink 46 positioned therebetween. The circular end wall 24 is adapted for interconnection to a beverage can body. A pull tab 8 is generally disposed on an upper surface of the center panel 4 and in one embodiment comprises a pull ring 10 interconnected to a pull tab 12 which is interconnected to the center panel 4 by means of a rivet 14. To facilitate grasping the pull ring 10, a recessed center panel
10 34 may be provided which allows a user's fingers to more easily grasp the pull ring 10.

Referring now to Figs. 2-4, additional detail is provided with regard to the small opening beverage can end. More specifically, Fig. 2 is a top plan view of one embodiment of the present invention (without the pull tab) and identifying a rupturable score line 16 which defines the small opening 6. Preferably the small opening 6 has a diameter of between
15 about 0.1865 inches to 0.3125 inches. A smaller diameter small opening would not permit the insertion of a typical drinking straw, while a larger vent opening 6 would not allow the beverage can end 2 to be substantially spill proof when the drinking straw is inserted in the small opening 6. The rivet 14 which interconnects the pull tab 8 to the top of center panel 4 is further seen positioned within the interior of the rupturable score line 16. As further
20 shown in Fig. 3, a recessed center panel 34 may be provided in the center panel 4 which provides additional spacing to allow a user to engage the pull ring 10 during use. Fig. 4 is an enlargement of the small opening 6 and which further defines a reinforcing bead 22 and

the substantially circular rivet 14. As appreciated by one skilled in the art, although a rivet is used in this particular application, other types of interconnection apparatus which are commonly known in the beverage industry for interconnecting a pull tab to a center panel may be provided herein.

5 In a preferred embodiment of the present invention the pull tab 8 is designed for “one direction” opening. More specifically, as the pull tab ring 10 is pulled upwardly and away from the center panel 4, the small opening 6 immediately opens around the rupturable score line 16 as the pull ring 10 is hingedly pulled to the opposing side of the center panel 4. Thus, the pull tab 8 is hingedly connected along a pull tab hinge line 32 to prevent the pull tab 8
10 from becoming disengaged from the center panel 4. By retaining the pull tab 8 on the center panel 4, the pull tab 8 and beverage can end 2 remain interconnected after opening which prevents littering.

As appreciated by one skilled in the art, the pull tab 8 is comprised of a pull tab nose 12 which is positioned proximate to the pull tab hinge line 32. As a downward force is applied to the pull tab nose 12, a small opening 6 is created around the rupturable score line 16 as an upward force is provided to the pull tab 8. Thus, the metal ruptures along the rupturable score line 16 and provides the small opening 6 in the beverage can end. Although only one particular type of pull tab 8 has generally been depicted in the drawings, as appreciated by one skilled in the art there are multiple variations of pull tabs 8 which can be
15 pulled in either one or two different directions to obtain the same result of creating an opening in the beverage can end 2. Thus, the present application is not intended to be limited
20

by the embodiment shown herein, but further encompasses all types of pull tab mechanisms commonly known in the beverage industry.

Referring now to Figs. 5-7, a top plan view of one embodiment of the beverage can end 2 is provided herein. More specifically, a progression of opening steps is shown, with
5 Fig. 5 representing the pull tab 8 in a closed position. In Fig. 6, the pull tab has been pulled upwardly to a 90° angle in relation to the center panel 4, and in Fig. 7 the pull tab 8 has been pulled 180° from its position shown in Fig. 5, and thus fully opening the beverage can end 2 to expose the small opening 6. As further seen in Fig. 7, the vent opening 20 is shown which provides adequate venting when a drinking straw 28 is positioned within said small
10 opening.

Referring now to Fig. 8A-8B, a raised reinforcing bead 36 is shown which is raised above the small opening 6 once the beverage can end 2 is opened. The reinforcing bead 36 serves two distinct purpose. First, the raised reinforcing bead 36 serves to prevent the small opening 6 from extending beyond the boundaries provided by the rupturable score line.
15 Second, the raised reinforcing bead 36 has been raised in this particular application to substantially encircle the small opening 6. The raised reinforcing bead 36 serves to shroud the small opening 6 which further reduces the likelihood of a user engaging a sharp leading edge of the small opening 6 which could cut a user's finger. This additional safety feature is especially beneficial for small children attempting to insert the drinking straw 28 in the
20 small opening 6, or for the handicapped or elderly.

Referring now to Fig. 8, a top plan view of the opening and associated raised bead 36 is shown and more specifically identifying the progression of opening. In Figs. 8A-8F,

the pull tab 8 has been removed from the rivet 14 to provide additional detail. Figs. 8A-8C represent the opening progression from a fully closed position in Fig. 8A to a fully open position in 8C. Additionally, Fig. 8D-8F represent a front elevation view of the detail shown in Figs. 8A-8C, and identifying the relative height of the components provided therein. More 5 specifically, and referring to Fig. 8A and 8D, a raised reinforcing bead 36 is shown substantially surrounding the small opening 6. Additionally, a lowered reinforcing bead 38 is shown positioned between the raised reinforcing bead 36 and the small opening 6.

Referring now to Fig. 8B and 8E, as the pull tab 8 is pulled, the small opening 6 begins to pull away along the rupturable score line 16. However, the raised reinforcing bead 10 36 is maintained in its position substantially surrounding the small opening 6. Referring now to Fig. 8C and 8F, when the pull tab is pulled completely away from the central panel 4, the small opening 6 is completely exposed to allow the insertion of a drinking straw 28. As 15 additionally seen in Fig. 8C, a vent opening 20 is provided which provides venting for the drinking straw when beverage content is removed from the beverage can. The vent opening 20 is preferably designed to be small enough to substantially prevent spilling if the beverage can is tipped when the drinking straw 28 is inserted in the small opening 6, yet large enough to prevent adequate venting as a beverage is withdrawn through the drinking straw 28. Although in this particular embodiment shown in Fig. 8C the vent opening 20 has a substantially triangular shape, it is understood that the vent opening could have any variety 20 of shapes based on the type of pull tab and score configuration utilized. In a preferred embodiment, the vent opening has an area of at least about 0.0004 in², which substantially prevents spilling when a straw is inserted in the small opening, yet provides adequate

venting. Although the size of the vent opening may be increased, it is preferably no greater than about 0.25 in².

Referring now to Fig. 9A-9F, a plurality of different reinforcing beads or “coins” are shown which are used to provide additional strength in the hinge mechanism of the pull tab 8 as it is interconnected along a pull tab hinge line 32. More specifically, and referring now to Fig. 9A, a plurality of reinforcing beads 44 may be positioned at a right angle along the hinge line 32 to provide reinforcement and prevent the pull tab 8 from being detached from the center panel 4. Referring now to Fig. 9B, the same benefit may be obtained by providing a wavy reinforcing bead 44 and/or a rectangular shape reinforcing bead 44 as shown in Fig. 9C. In an alternative design to prevent the pull tab 8 from becoming detached from the center panel 4, the pull tab hinge line 32 may be increased in length as shown in Fig. 9D, or provided at a substantially right angle as shown in Fig. 9E. Additionally, as shown in Fig. 9F a dual score line 42 may be provided to further reinforce the pull tab hinge line 32 at the point of interconnection between the pull tab 8 and the center panel 4. Depending on what type of reinforcing bead and/or score termination 40 is used, the size and shape of the vent opening 20 may be modified to be custom designed for various types of drinking straw 28 applications.

Referring now to Fig. 10, a plurality of different sizes and shapes of small openings 6 is provided herein. For example, the small opening 6 may be comprised of a square, triangle, diamond, oval, round, or a variety of odd shapes as shown in the bottom right hand corner. Based on the size and shape of a typically round drinking straw 28, each of these

particular embodiments provide different vent openings 20 which further enhance the ability of the beverage to be withdrawn from the drinking can.

Referring now to Fig. 11, a top plan view is provided in Fig. 11A and 11B of two different shaped pull rings. Cross-sectional views taken along line D-D are provided in Figs.

5 11C and 11D, respectively which depict the rounded corners 48. These rounded corners are specifically designed to eliminate sharp edges and to reduce the likelihood of a user cutting a finger when grasping the pull tab 8. Further, as depicted in Figs. 11A-11B, a billboard 50 may be printed directly on the outer (or inner) surface of the pull tab 8 which provides indicia in the form of instructions, advertising, etc.

10 As seen in Fig. 12, a front elevation view is provided which shows the drinking straw 28 positioned within the small opening 6. More specifically, the relative size and shape of the vent opening 20 is shown with respect to the drinking straw 28. In the embodiment shown, the diameter of the drinking straw 28 is substantially equivalent to the diameter of the small opening 6, and the drinking straw corrugations are engaged to an edge of the small opening 15 6 to prevent inadvertent removal. Thus, in this embodiment the beverage can opening is substantially spill-proof, yet has a vent opening 20 of sufficient dimension to provide adequate venting.

The following components and numbers associated with the present invention are provided herein for clarity purposes.

	<u>#</u>	<u>Component</u>
	2	Beverage can end
5	4	Center panel
	6	Small opening
	8	Pull tab
	10	Pull ring
	12	Pull tab nose
10	14	Rivet
	16	Rupturable score line
	18	Secondary score line
	20	Vent opening
	22	Reinforcing bead
15	24	Circular end wall
	26	Score termination point
	28	Drinking straw
	30	Straw corrugated midsection
	32	Pull tab hinge line
20	34	Recessed center panel
	36	Raised reinforcing bead
	38	Lowered bead

	40	Opposing score termination
	42	Dual score line
	44	Reinforcing bead
	46	Countersink
5	48	Pull tab rounded corners
	50	Billboard

The foregoing description of the present invention has been presented for purposes of illustration and description. Furthermore, the description is not intended to limit the invention to the form disclosed herein. Consequently, variations and modifications 10 commensurate with the above teachings and the skill or knowledge of the relevant art are within the scope of the present invention. The embodiments described hereinabove are further intended to explain best modes known for practicing the invention and to enable others skilled in the art to utilize the invention in such, or other, embodiments or various modifications required by the particular applications or uses of the present invention. It is 15 intended that the appended claims be construed to include alternative embodiments to the extent permitted by the prior art.